CLAIMS

1. A light-emitting thyristor, comprising :

a GaAs substrate ; and

a GaAs buffer layer provided on the GaAs substrate ; and

four layers consisting of a first conductivity type of AlGaAs layer and a second conductivity type of AlGaAs layer stacked alternately on the buffer layer;

wherein the AlGaAs layer just above the buffer layer is composed of a plurality of AlGaAs layers, Al compositions thereof being increased upward in steps.

2. The light-emitting thyristor of claim 1, wherein a quantum well layer or a strained superlattice structure is inserted into the uppermost layer of the plurality of AlGaAs layers.

3. A light-emitting thyristor, comprising :

a GaAs substrate ; and

a GaAs buffer layer provided on the GaAs substrate ; and

four layers consisting of a first conductivity type of AlGaAs layer and a second conductivity type of AlGaAs layer stacked alternately on the buffer layer;

wherein the Al composition of the AlGaAs layer just above the buffer layer is increased upward continuously.

4. The light-emitting thyristor of claim 3, wherein a quantum well layer or a strained superlattice structure is inserted into the AlGaAs layer just above the buffer layer.

5. A light-emitting thyristor, comprising :

a GaAs substrate ;

a GaAs buffer layer provided on the GaAs substrate ; and

four layers consisting of a first conductivity type of AlGaAs layer and a second conductivity type of AlGaAs layer stacked alternately on the buffer layer;

wherein a quantum well layer on a strained superlattice structure is inserted between the buffer layer and the AlGaAs layer just above the buffer layer, or into the AlGaAs layer just above the buffer layer.

6. A light-emitting thyristor, comprising :

a substrate ; and

four layers consisting of a first conductivity type of semiconductor layer and a second conductivity type of semiconductor layer stacked alternately on the substrate; and

wherein an uppermost layer from which light is emitted comprises material selected from a group consisting of InGaP, InGaAsP, and AlGaInP.

7. The light-emitting thyristor of claim 6, wherein the composition of the selected material is adjusted so as to be lattice matched with the material of the substrate.

8. The light-emitting thyristor of claim 7, wherein the material of the substrate is GaAs.

9. A light-emitting thyristor, comprising :

a p-type anode layer ;

an n-type gate layer formed adjacent to the p-type anode layer ;

a p-type layer formed adjacent to the n-type gate

layer ; and

an n-type cathode layer formed adjacent to the p-type gate layer ;

wherein an impurity concentration of at least the part of the anode layer near the n-type gate layer is lower than an impurity concentration of the n-type gate layer.

10. The light-emitting thyristor of claim 9, wherein the impurity of the anode layer is Zn.

11. The light-emitting thyristor of claim 9, wherein the impurity of the anode layer is Zn, and the impurity of the n-type gate is Si.

12. A self-scanning light-emitting device, comprising:

a structure in which a plurality of light-emitting elements each having a control electrode for controlling threshold voltage or current for light-emitting operation are arranged, the control electrodes of the light-emitting elements are connected to the control electrode of at least one light-emitting element located in the vicinity thereof via an interactive resistor, and a plurality of wirings to which voltage or current is applied are connected to electrodes for controlling the light emission of light-emitting elements,

wherein the light-emitting element is a light-emitting thyristor as set forth in any one of claims 1-11.

13. A self-scanning light-emitting device, comprising:

a structure in which a plurality of light-emitting

elements each having a control electrode for controlling threshold voltage or current for light-emitting operation are arranged, the control electrodes for the light-emitting elements are connected to the control electrode of at least one light-emitting element located in the vicinity thereof via an electrically unidirectional element, and a plurality of wiring to which voltage or current is applied are connected to electrodes for controlling the light emission of light-emitting elements,

wherein the light-emitting element is a light-emitting thyristor as set forth in any one of claims 1-11.

14. The self-scanning light-emitting device of claim 13, wherein the electrically unidirectional element is a diode.

15. A self-scanning light-emitting device, comprising :

a self-scanning transfer element array having such a structure that a plurality of transfer elements each having a control electrode for controlling threshold voltage or current for transfer operation are arranged, the control electrodes of the transfer elements are connected to the control electrode of at least one transfer element located in the vicinity thereof via an interactive resistor, power-supply lines are connected to the transfer elements by electrical means, and clock lines are connected to the transfer elements, and

a light-emitting element array having such a structure that a plurality of light-emitting elements each having a control electrode for controlling threshold voltage or current are arranged, the control electrodes of the light-

emitting element array are connected to the control electrodes of said transfer elements by electrical means, and lines for applying current for light emission of the light-emitting element are provided,

wherein the light-emitting element is a light-emitting thyristor as set forth in any one of claims 1-11.

16. A self-scanning light-emitting device, comprising :

a self-scanning transfer element array having such a structure that a plurality of transfer elements each having a control electrode for controlling threshold voltage or current for transfer operation are arranged, the control electrodes of the transfer elements are connected to the control electrode of at least one transfer element located in the vicinity thereof via an electrically unidirectional element, power-supply lines are connected to the transfer elements by electrical means, and clock lines are connected to the transfer elements, and

a light-emitting element array having such a structure that a plurality of light-emitting elements each having a control electrode for controlling threshold voltage or current are arranged, the control electrodes of the light-emitting element array are connected to the control electrodes of said transfer elements by electrical means, and lines for applying current for light emission of the light-emitting element are provided,

wherein the light-emitting element is a light-emitting thyristor as set forth in any one of claims 1-11.

17. The self-scanning light-emitting device of claim 16,

wherein the electrically unidirectional element is a diode.